



## DEPARTMENT OF THE INTERIOR

### Fish and Wildlife Service

#### 50 CFR Part 17

[FWS–R1–ES–2013–0117; MO 92210–0–0008 B2]

RIN 1018–BA27

### Endangered and Threatened Wildlife and Plants; Threatened Status for *Lepidium papilliferum* (Slickspot Peppergrass) Throughout Its Range

**AGENCY:** Fish and Wildlife Service, Interior.

**ACTION:** Reconsideration of final rule and request for comments.

**SUMMARY:** We, the U.S. Fish and Wildlife Service (Service), amend and update, and provide and request further information in regard to, our October 8, 2009, final rule listing *Lepidium papilliferum* (slickspot peppergrass) as a threatened species throughout its range under the Endangered Species Act of 1973 (ESA or Act). We are addressing the Idaho District Court’s remand of our rule because the Court asked us to reconsider the definition of the “foreseeable future” in regard to this particular species. We announce

the opening of a public comment period seeking input on our interpretation of the foreseeable future as it pertains specifically to *L. papilliferum*. We will also consider any new information regarding population status, trends, or threats that has become available since our last review of the status of the species in 2009.

**DATES:** We will consider comments received or postmarked on or before **[INSERT DATE 30 DAYS AFTER DATE OF FEDERAL REGISTER PUBLICATION]**. Please note that comments submitted electronically using the Federal eRulemaking Portal (see ADDRESSES) must be received by 11:59 p.m. Eastern Time on the closing date. Any comments that we receive after the closing date may not be considered in the final decision.

**ADDRESSES:** Comment submission: You may submit written comments by one of the following methods:

(1) Electronically: Go to the Federal eRulemaking Portal:

<http://www.regulations.gov>. Search for FWS–R1–ES–2013–0117, which is the docket number for this rulemaking. You may submit a comment by clicking on “Comment Now!”

(2) By hard copy: Submit by U.S. mail or hand-delivery to: Public

Comments Processing, Attn: FWS–R1–ES–2013–0117; Division of Policy and Directives Management; U.S. Fish and Wildlife Service; 4401 N. Fairfax Drive, MS 2042–PDM; Arlington, VA 22203.

We request that you send comments only by the methods described above. We will post all comments on <http://www.regulations.gov>. This generally means that we will post any personal information you provide us (see the Public Comments section below for more information).

**FOR FURTHER INFORMATION CONTACT:** Acting State Supervisor, U.S. Fish and Wildlife Service, Idaho Fish and Wildlife Office, 1387 S. Vinnell Way, Room 368, Boise, ID 83709; telephone 208–378–5243; facsimile 208–378–5262. If you use a telecommunications device for the deaf (TDD), call the Federal Information Relay Service (FIRS) at 1–800–877–8339.

## **SUPPLEMENTARY INFORMATION:**

### **Executive Summary**

#### **Purpose of this document.**

We are responding to the U.S. District Court for the District of Idaho’s August 8, 2012, Memorandum Decision and Order vacating our October 8, 2009, final rule listing *Lepidium papilliferum* (slickspot peppergrass) as a threatened species (74 FR 52014) (2009 final listing rule) and remand of the rule to the Service for further consideration consistent with the Court’s decision. The Act defines an endangered species as any species that is “in danger of extinction throughout all or a significant portion of its range”

and a threatened species as any species “that is likely to become endangered throughout all or a significant portion of its range within the foreseeable future.” The Act does not define the term “foreseeable future.” With respect to the Service’s finding of threatened status for *L. papilliferum*, the Court was supportive, stating that “...the Service’s finding underlying the above conclusion [that *L. papilliferum* is likely to become an endangered species within the foreseeable future] are (*sic*) supported by the administrative record and entitled to deference.” *Otter v. Salazar*, Case No. 1:11-cv-358-CWD, at 50 (D. Idaho, Aug. 8, 2012) (*Otter v. Salazar*). However, the Court took issue with the Service’s application of the concept of the “foreseeable future” in the 2009 final listing rule. Although it found “no problem with the agency’s science,” the Court stated that “without a viable definition of foreseeable future, there can be no listing under the ESA.” *Otter v. Salazar*, at 55. Based on this conclusion, the Court vacated the 2009 listing determination and remanded it to the Secretary for further consideration consistent with the Court’s decision.

We are proposing to reinstate threatened status of *Lepidium papilliferum* under the Act with an amended definition of the foreseeable future, consistent with the Court’s opinion and applied specifically to this species. We will also evaluate any new scientific information that may have become available since our 2009 final listing rule. This will ensure that our present determination remains based on the best scientific and commercial data available. We are seeking public comments on our amended definition of foreseeable future and to assist us in our evaluation of any new scientific information pertaining to this species.

## **The basis for our action.**

Section 4 of the Act and its implementing regulations (50 CFR 424) set forth the procedures for adding species to the Federal Lists of Endangered and Threatened Wildlife and Plants. A species may be determined to be an endangered or threatened species due to one or more of the five factors described in section 4(a)(1) of the Act: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. Listing actions may be warranted based on any of the above threat factors, singly or in combination. Each of the factors relevant to *Lepidium papilliferum* is discussed below and in our 2009 final listing rule.

## **Public Comments**

We will base any final action on the best scientific and commercial data available. Therefore, we are seeking comments from the public, other concerned governmental agencies, Native American tribes, the scientific community, industry, or any other interested party concerning the reinstatement of threatened status for *Lepidium papilliferum*. We particularly seek comments concerning:

- (1) Our interpretation of the term “foreseeable future” and its application to our evaluation of the status of *Lepidium papilliferum*;
- (2) Our evaluation of new scientific information concerning the range, distribution, population size and trends, and threats to the species that has become available since publication of the 2009 final listing rule;
- (3) Our choice of the threshold of 80 to 90 percent loss of remaining unburned habitat as the point at which the species will be in danger of extinction (see discussion below under **Factors Affecting the Species** for details on our rationale supporting our conclusion);
- (4) Any additional scientific information concerning the range, distribution, population size and trends, or threats to the species that has become available since publication of the 2009 final listing rule that we have not already presented and considered here; and
- (5) Current or planned activities in the subject area that were not analyzed in the 2009 final listing rule and their possible effect on this species.

We will consider all comments and information received during the comment period on this rulemaking during our preparation of a final determination. Comments previously submitted on the proposed listing of *Lepidium papilliferum* need not be resubmitted; they have already been incorporated into the public record and will be fully considered in the final decision.

Please note that submissions merely stating support for or opposition to the action

under consideration without providing supporting information, although noted, will not be considered in making a determination, as section 4(b)(1)(A) of the Act directs that determinations as to whether any species is an endangered or threatened species must be made "solely on the basis of the best scientific and commercial data available."

You may submit your comments and materials by one of the methods listed in **ADDRESSES**. We request that you send comments only by the methods described in **ADDRESSES**.

If you submit information via <http://www.regulations.gov>, your entire submission—including any personal identifying information—will be posted on the website. If your submission is made via a hardcopy that includes personal identifying information, you may request at the top of your document that we withhold this information from public review. However, we cannot guarantee that we will be able to do so. We will post all hardcopy submissions on <http://www.regulations.gov>. Please include sufficient information with your comments to allow us to verify any scientific or commercial information you include.

In making a final decision on this matter, we will take into consideration the comments and any additional information we receive. Comments and materials received, as well as some of the supporting documentation used in the preparation of a final decision, will be available for public inspection on <http://www.regulations.gov>. All information we use in making our decision is available by appointment, during normal

business hours, at the U.S. Fish and Wildlife Service, Idaho Fish and Wildlife Office, 1387 S. Vinnell Way, Room 368, Boise, ID 83709; telephone 208–378–5243; facsimile 208–378–5262 (see **FOR FURTHER INFORMATION CONTACT**).

### **Previous Federal Actions**

On July 15, 2002, we proposed to list *Lepidium papilliferum* as an endangered species (67 FR 46441). On January 12, 2007, we published a document in the **Federal Register** withdrawing the proposed rule (72 FR 1622), based on a determination at that time that listing was not warranted (for a description of Federal actions concerning *L. papilliferum* between the 2002 proposal to list and the 2007 withdrawal, please refer to the 2007 withdrawal document). On April 6, 2007, Western Watersheds Project filed a lawsuit challenging our decision to withdraw the proposed rule to list *L. papilliferum*. On June 4, 2008, the U.S. District Court for the District of Idaho (Court) reversed the decision to withdraw the proposed rule, with directions that the case be remanded to the Service for further consideration consistent with the Court’s opinion (*Western Watersheds Project v. Kempthorne*, Case No. CV 07–161–E–MHW (D. Idaho)).

After issuance of the Court’s remand order, we published a public notification of the reinstatement of our July 15, 2002, proposed rule to list *Lepidium papilliferum* as an endangered species and announced the reopening of a public comment period on September 19, 2008 (73 FR 54345). To ensure that our review of the species’ status was based on complete information, we announced another reopening of the comment period

on March 17, 2009 (74 FR 11342). On October 8, 2009, we published a final rule (74 FR 52014) listing *L. papilliferum* as a threatened species throughout its range.

On November 16, 2009, Idaho Governor C. L. “Butch” Otter, the Idaho Office of Species Conservation, Theodore Hoffman, Scott Nicholson, and L.G. Davison & Sons, Inc., filed a complaint in the U.S. District Court for the District of Columbia challenging the 2009 final listing rule under the Administrative Procedure Act and the Endangered Species Act. Subsequently, the issue was transferred to the U.S. District Court for the District Court of Idaho (Court), and the parties involved consented to proceed before a Magistrate Judge. On August 8, 2012, the Court vacated the final rule listing *Lepidium papilliferum* as a threatened species under the Act, with directions that the case be remanded to the Service for further consideration consistent with the Court’s opinion. *Otter v. Salazar*, Case No. 1:11-cv-358-CWD (D. Idaho). This document constitutes our reconsideration of the issue remanded by the Court.

## **Background and New Information**

A complete description of *Lepidium papilliferum*, including a discussion of its life history, ecology, habitat requirements and monitoring of extant populations, can be found in the October 8, 2009, final rule (74 FR 52014). However, to ensure that we are considering the best scientific and commercial data available in our final decision, here we present new scientific information that has become available to us since our 2009

determination of threatened status, and evaluate that new information in light of our previous conclusions regarding the status of the species.

#### *New Information Related to the Proposed Listing of *Lepidium papilliferum**

We are evaluating information presented in the 2009 final listing rule, as well as new information, regarding population status, trends, or threats that has become available since 2009, including current element occurrence (EO) data provided to us by the Idaho Fish and Wildlife Information System (IFWIS) database (formerly the Idaho Natural Heritage Program database), updated fire history data, the new rangewide Habitat Integrity and Population (HIP) monitoring data, information on current developments being proposed within the range of *L. papilliferum*, and the most current data on seed predation by Owyhee harvester ants (*Pogonomyrmex salinus*), as described in the **Factors Affecting the Species** section, below.

Relatively limited new data regarding population abundance or trends has become available since our 2009 final listing rule. In 2011 and 2012, the total number of *Lepidium papilliferum* plants counted was the lowest since 2005, when complete counts for this species were initiated, with 16,462 plants in 2011 and 9,202 plants in 2012 (Kinter 2012, *in litt.*). Previously, the lowest total number of plants counted occurred in 2006, with 17,543 plants, and the highest count was in 2010, with 58,921 plants (IDFG 2012, p. 5). Meyer *et al.* (2005, p. 21) suggest that *L. papilliferum* relies on years with extremely favorable climactic elements to resupply the seed bank (i.e., high bloom years

with good weather), and during unfavorable years, it is dependent upon a persistent seed bank to maintain the population.

In 2009, there were 80 extant *Lepidium papilliferum* EOs documented according to IFWIS data. Survey efforts over the past few years have located additional *L. papilliferum* occupied sites. According to IFWIS data, existing EOs have been expanded (and in some cases merged with other EOs to meet the definition of an EO, by grouping occupied slickspots that occur within 1 kilometer (km) (0.6 miles (mi)) of each other), and eight new EOs have been located. According to the most recent IFWIS data, there are now 87 extant *L. papilliferum* EOs (although it would seem there should be 88, the apparent discrepancy in numbers is due to the intervening merging and deleting of EOs between 2009 and the present, as documented in the record). The discovery of some new occupied sites is not unexpected given not all potential *L. papilliferum* habitats in southwest Idaho have been surveyed. While the discovery of these new sites is encouraging, they are located near or in the vicinity of existing EOs, and therefore do not expand the known range of the species; they are all subject to the same threats affecting the species, and their associated ranks indicate they are not high-quality EOs. The existing EOs have not been re-ranked since 2005; however, the ranks given to the new EOs include one BC, one BD, three C, two CD, and one D (IFWIS data from January 2013). See the **Monitoring of *Lepidium papilliferum* Populations** section in the 2009 final listing rule for a more detailed discussion of EOs.

As discussed below in the section **Factors Affecting the Species**, the new information generally supports our 2009 conclusions on the present distribution of *Lepidium papilliferum*, its status and population trends, and how the various threat factors are affecting the species.

### **Foreseeable Future**

As indicated earlier, the Act defines a “threatened species” as any species (or subspecies or, for vertebrates, distinct population segments) that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The Act does not define the term “foreseeable future.” In a general sense, the foreseeable future is the period of time over which events can reasonably be anticipated; in the context of the definition of “threatened species,” the Service interprets the foreseeable future as the extent of time over which the Secretary can reasonably rely on predictions about the future in making determinations about the future conservation status of the species. It is important to note that references to “reliable predictions” are not meant to refer to reliability in a statistical sense of confidence or significance; rather the words “rely” and “reliable” are intended to be used according to their common, non-technical meanings in ordinary usage. In other words, we consider a prediction to be reliable if it is reasonable to depend upon it in making decisions, and if that prediction does not extend past the support of scientific data or reason so as to venture into the realm of speculation.

In considering threats to the species and whether they rise to the level such that listing the species as a threatened or endangered species is warranted, we assess factors such as the imminence of the threat (is it currently affecting the species or, if not, when do we expect the effect from the threat to commence, and whether it is reasonable to expect the threat to continue into the future), the scope or extent of the threat, the severity of the threat, and the synergistic effects of all threats combined. If we determine that the species is not currently in danger of extinction, then we must determine whether, based upon the nature of the threats, it is reasonable to anticipate that the species may become in danger of extinction within the foreseeable future. As noted in the 2009 Department of the Interior Solicitor's opinion on foreseeable future, "in some cases, quantifying the foreseeable future in terms of years may add rigor and transparency to the Secretary's analysis if such information is available. Such definitive quantification, however, is rarely possible and not required for a foreseeable future analysis" (M-37021, January 16, 2009; p. 9).

In some specific cases where extensive data were available to allow for the modeling of extinction probability over various time periods (e.g., Greater Sage-grouse (75 FR 13910; March 23, 2010), the Service has provided quantitative estimates of what may be considered to constitute the foreseeable future. We do not have such data available for *Lepidium papilliferum*. Therefore, our analysis of the foreseeable future for the purposes of assessing the status of *L. papilliferum* must rely on the foreseeability of the relevant threats to the species over time, as described by the Solicitor's opinion (M-37021, January 16, 2009; p. 8). The foreseeable future extends only so far as the

Secretary can explain reliance on the data to formulate a reliable prediction, based on the extent or nature of the data currently available, and to extrapolate any trend beyond that point would constitute speculation.

In earlier evaluations of the status of *Lepidium papilliferum*, the Service assembled panels of species and ecosystem experts to assist in our review through a structured decision-making process. As part of those evaluations, to help inform the decisions to be made by the Service managers, experts were asked to provide their best estimate of a timeframe for extinction of *L. papilliferum*, and were allowed to distribute points between various predetermined time categories, or to assign an extinction probability of low, medium, or high between time categories (e.g., 1 to 20 years, 21 to 40 years, 41 to 60 years, 61 to 80 years, 81 to 100 years, 101 to 200 years, and 200 years and beyond). We note that this type of exercise was not intended to provide a precise quantitative estimate of the foreseeable future, nor was it meant to provide the definitive answer as to whether *L. papilliferum* is likely to become an endangered species within the foreseeable future. Rather, this type of exercise is used to help inform Service decision-makers, and ultimately the Secretary, as to whether there is broad agreement amongst the experts as to extinction probability within a certain timeframe.

In fact, the species experts expressed widely divergent opinions on extinction probabilities over various timeframes. As an example, in 2006, the estimated timeframes for extinction from seven different panel members fell into every time category presented ranging from 21 to 40 years up to 101 to 200 years. Because the species experts'

divergent predictions were based on “reasonable, best educated guesses,” we did not consider the range of timeframes to represent a prediction that can be reasonably relied upon to make a listing determination. As noted in the Solicitor’s opinion, “the mere fact that someone has made a prediction concerning the future does not mean that the thing predicted is foreseeable for the purpose of making a listing determination under section 4 of the ESA” (M–37021, January 16, 2009; p. 10).

In our 2009 final listing rule, we did not present species experts with predetermined potential timeframes within which to estimate extinction probability for the species. Rather, we asked peer reviewers to provide us with their estimated projection of a time period for reliably predicting threat effects or extinction risk for the species. In response, most peer reviewers declined, stating that such future projections were likely speculative. One peer reviewer suggested that given current trends in habitat loss and degradation, *L. papilliferum* “is likely at a tipping point in terms of its prospect for survival,” and doubted that the species would persist in sustainable numbers beyond the next 50 to 75 years (74 FR 52055).

As suggested in the Solicitor’s opinion, for the purposes of the present analysis, we are relying on an evaluation of the foreseeability of threats and the foreseeability of the effect of the threats on the species, extending this time period out only so far as we can rely on the data to formulate reliable predictions about the status of the species, and not extending so far as to venture into the realm of speculation. Therefore, in the case of *Lepidium papilliferum*, we conclude that the foreseeable future is that period of time

within which we can reliably predict whether or not *Lepidium papilliferum* is likely to become an endangered species as a result of the effects of wildfire, invasive nonnative plants, and other threats to the species. As explained below, with respect to the principal threat factors, the foreseeable future for *Lepidium papilliferum* is at least 50 years.

### **Factors Affecting the Species**

Section 4 of the Act and its implementing regulations (50 CFR 424) set forth the procedures for adding species to the Federal Lists of Endangered and Threatened Wildlife and Plants. A species may be determined to be an endangered or threatened species due to one or more of the five factors described in section 4(a)(1) of the Act: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. Listing actions may be warranted based on any of the above threat factors, singly or in combination.

A detailed discussion and analysis of each of the threat factors for *Lepidium papilliferum* can be found in the final listing rule. For the purpose of this document, we are limiting our discussion of foreseeable future to the threats we consider significant in terms of contributing to the present or threatened destruction, modification, or curtailment of *L. papilliferum*'s habitat or range. These include the two primary threat factors: altered wildfire regime (increasing frequency, size, and duration of wildfires),

and invasive, nonnative plant species (e.g., *Bromus tectorum* (cheatgrass)); as well as contributing threat factors of planned or proposed development, habitat fragmentation and isolation, and the emerging threat from seed predation by Owyhee harvester ants (*Pogonomyrmex salinus*). Here we present a brief summary of each of the primary threats to *L. papilliferum* for the purposes of considering new information received since 2009 and of analyzing these threats in the context of the foreseeable future, in order to reconsider whether *L. papilliferum* meets the definition of a threatened species.

In considering potential threatened species status for *Lepidium papilliferum*, it is useful to first describe what endangered species status (in danger of extinction throughout all or a significant portion of its range) for *L. papilliferum* would be. *Lepidium papilliferum* will be in danger of extinction (an endangered species) when the anticipated and continued synergistic effects of increased wildfire, invasive nonnative plants, development, and other known threats affect the remaining extant *L. papilliferum* habitats at a level where the species would persist only in a small number of isolated EOs, most likely with small populations and fragmented from other extant populations. Wildfire usually results in a mosaic of burned and unburned areas, and while some EOs may persist for a time in unburned habitat “islands” within burned areas, the resulting habitat fragmentation will cause any such EOs to be subject to a high degree of vulnerability, such that they may not have long-term viability. For example, wildfire often leads to a type conversion from native sagebrush-steppe to annual grassland, in which the habitat goes through successional changes resulting in grasslands dominated by invasive nonnative grasses, rather than the slickspot habitat needed by *L. papilliferum*. Therefore,

although a few individuals of the species may continue to be found in burned areas, those individuals would be subject to the full impact of the threats acting on the species, and thus be highly vulnerable to extirpation, as detailed in the **Summary of Factors Affecting the Species**, below. In order to estimate when this might occur, we chose a threshold of 80 to 90 percent loss of or damage to the currently remaining unburned habitat (we are seeking public comment on the appropriateness of this choice of threshold). Should this loss of 80 to 90 percent of current habitat happen, we believe that the remaining 10 to 20 percent of its present habitat would be so highly fragmented that it would detrimentally affect successful insect pollination and genetic exchange, leading to a reduction in genetic fitness and genetic diversity, and a reduced ability to adapt to a changing environment. There would be little probability of recolonization of formerly occupied sites at this point, and remaining small, isolated populations would be highly vulnerable to local extirpation from a variety of threats. In addition, smaller, more isolated EOs could also exacerbate the threat of seed predation by Owyhee harvester ants, as small, isolated populations deprived of recruitment through their seed bank due to seed predation would be highly vulnerable to relatively rapid extirpation. All of these effects are further magnified by the consideration that *L. papilliferum* is a relatively local endemic, and presently persists in specialized microhabitats that have already been greatly reduced in extent (more than 50 percent of known *L. papilliferum* EOs have already been affected by wildfire). Therefore, if *L. papilliferum* should reach this point at which a further 80 to 90 percent of its present remaining habitat is severely impacted by the effects of wildfire, invasive nonnative plants, and other threats, we predict it would then be in danger of extinction.

We have analyzed and assessed known threats impacting *Lepidium papilliferum*, and used the best available information to carefully consider what effects these known threats will have on this species in the future, and over what timeframe, in order to determine what constitutes the foreseeable future for each of these known threats. In considering the foreseeable future as it relates to these threats, we considered information presented in the 2009 final listing rule, and information we have obtained since the publication of that rule, including: (1) The historical data to identify any relevant existing trends that might allow for reliable prediction of the future; (2) any information that suggests these threats may be alleviated in the near term; and (3) how far into the future we can reliably predict that these threats will continue to affect the status of the species, recognizing that our ability to make reliable predictions into the future is limited by the quantity and quality of available data. Below, we provide a summary of our analysis of each known threat, and discuss the information regarding the timing of these threats on which we base our conclusions regarding the application of the foreseeable future.

#### *Altered Wildfire Regime*

The current altered wildfire regime and invasive, nonnative plant species were cited in the final listing rule as the primary cause for the decline of *Lepidium papilliferum*. The invasion of nonnative plant species, particularly annual grasses such as *Bromus tectorum* and *Taeniatherum caput-medusae* (medusahead), has contributed to

increasing the amount and continuity of fine fuels across the landscape, and as a result, the wildfire frequency interval has been shortened from between 60 to 110 years historically to less than 5 years in many areas of the sagebrush-steppe ecosystem at present (Wright and Bailey 1982, p. 158; Billings 1990, pp. 307–308; Whisenant 1990, p. 4; USGS 1999, *in litt.*, pp. 1–9; West and Young 2000, p. 262). These wildfires tend to be larger and burn more uniformly than those that occurred historically, resulting in fewer patches of unburned vegetation, which can affect the post-fire recovery of native sagebrush-steppe vegetation (Whisenant 1990, p. 4). The result of this altered wildfire regime has been the conversion of vast areas of the former sagebrush-steppe ecosystem to nonnative annual grasslands (USGS 1999, *in litt.*, pp. 1–9). Frequent wildfires can also promote soil erosion and sedimentation (Bunting *et al.* 2003, p. 82) in arid environments such as the sagebrush-steppe ecosystem. Increased sedimentation can result in a silt layer that is too thick for optimal *L. papilliferum* germination (Meyer and Allen 2005, pp. 6–7). Wildfire also damages biological soil crusts, which are important to the sagebrush-steppe ecosystem and slickspots where *L. papilliferum* occur, because the soil crusts stabilize and protect soil surfaces from wind and water erosion, retain soil moisture, discourage annual weed growth, and fix atmospheric nitrogen (Eldridge and Greene 1994 as cited in Belnap *et al.* 2001, p. 4; Johnston 1997, pp. 8-10; Brooks and Pyke 2001, p. 4).

Several researchers have noted signs of increased habitat degradation for *Lepidium papilliferum*, most notably in terms of exotic species cover and wildfire frequency (e.g., Moseley 1994, p. 23; Menke and Kaye 2006, p. 19; Colket 2008, pp. 33–34), but only recently have analyses demonstrated a statistically significant, negative

relationship between the degradation of habitat quality, both within slickspot microsites and in the surrounding sagebrush-steppe matrix, and the abundance of *L. papilliferum*. Sullivan and Nations (2009, pp. 114–118, 137) found a consistent, statistically significant, negative correlation between wildfire and the abundance of *L. papilliferum* across its range. Their analysis of 5 years of Habitat Integrity and Population (HIP) monitoring data indicated that *L. papilliferum* “abundance was lower within those slickspot [sic] that had previously burned” (Sullivan and Nations 2009, p. 137), and the relationship between *L. papilliferum* abundance and fire is reported as “relatively large and statistically significant,” regardless of the age of the fire or the number of past fires (Sullivan and Nations 2009, p. 118). The nature of this relationship was not affected by the number of fires that may have occurred in the past; whether only one fire had occurred or several, the association with decreased abundance of *L. papilliferum* was similar (Sullivan and Nations 2009, p. 118).

The evidence also points to an increase in the geographic extent of wildfire within the range of *Lepidium papilliferum*. Since the 1980s, 53 percent of the total *L. papilliferum* management area acreage rangewide has burned, more than double the acreage burned in the preceding three decades (from the 1950s through 1970s) (Hardy 2013, *in litt.*). Management areas are units containing multiple EOs in a particular geographic area with similar land management issues or administrative boundaries as defined in the 2003 Candidate Conservation Agreement (State of Idaho 2006, p. 9). Based on available information, approximately 11 percent of the total management area burned in the 1950s; 1 percent in the 1960s; 15 percent in the 1970s; 26 percent in the

1980s; 34 percent in the 1990s; and as of 2007, 11 percent in the 2000s (data based on GIS fire data provided by BLM Boise and Twin Falls District; I. Ross 2008, pers. comm. and A. Webb 2008, pers. comm., as cited in Colket 2008, p. 33). Incorporating more recent data (fire data up to 2012), 12 percent of the total management area burned from 2000 to 2009, with 1 percent burning from 2010 to 2012 (Hardy 2013, *in litt.*). Based on the negative relationship observed between fire, *L. papilliferum*, and habitat quality as described above, we conclude that this increase in area burned translates into an increase in the number of *L. papilliferum* populations subjected to the negative effects of wildfire.

More specifically, an evaluation of *Lepidium papilliferum* EOs for which habitat information has been documented (79 of 80 EOs) demonstrates that most have experienced the effects of fire. Fifty-five of 79 EOs have been at least partially burned (14 of 16 EOs on the Boise Foothills, 30 of 42 EOs on the Snake River Plain and 11 of 21 EOs on the Owyhee Plateau), and 75 EOs have adjacent landscapes that have at least partially burned (16 of 16 EOs on the Boise Foothills, 39 of 42 EOs on the Snake River Plain, and 20 of 21 EOs on the Owyhee Plateau) (Cole 2009, Threats Table).

In the 2009 final listing rule, we presented a geospatial data analysis that evaluated the total *Lepidium papilliferum* EO area affected by wildfire over 50 years (from 1957 to 2007). This analysis found that the perimeter of previous wildfires had encompassed approximately 11,442 ac (4,509 ha) of the total *L. papilliferum* EO area rangewide (Stoner 2009, p. 48). However, in this analysis, areas that burned twice were counted twice. When we eliminate reoccurring fires and reanalyzed the data to account

only for how much area burned at least once, we find that the perimeter of wildfires that had occurred over the same time period (1957–2007) encompassed approximately 7,475 ac (3,025 ha), or 47 percent of the total *L. papilliferum* EO area rangewide (Hardy 2013, *in litt.*). At the time of the 2009 final listing rule (74 FR 52014; October 8, 2009), the total area of known EOs was estimated to be approximately 16,000 ac (6,500 ha) (this area reflects only the immediate known locations of individuals of *L. papilliferum* as recognized in the IFWIS database, and does not represent the much larger geographic range of the species).

Since the 2009 listing, wildfires have continued to affect *Lepidium papilliferum* EOs and the surrounding habitat. Data collected over the past 5 years (from 2008 to 2012) indicates that there were 15 additional fires that burned approximately 1,190 ac (482 ha) of *L. papilliferum* EOs, with approximately 850 ac (340 ha) located in areas that had not previously burned (Hardy 2013, *in litt.*). Using new fire information since 2009, and considering only impacts to new, previously unburned areas, we updated the geospatial analysis and found that over the past 55 years (1957–2012) the perimeters of 126 wildfires occurring within the known range of *L. papilliferum* have burned approximately 8,324 ac (3,369 ha), or 53 percent of the total *L. papilliferum* EO area rangewide (Hardy 2013, *in litt.*).

We recognize that caution should be used in interpreting geospatial information as it represents relatively coarse vegetation information that may not reflect that some EOs may be located within remnant unburned islands of sagebrush habitat within fire

perimeters. However, it is the best available information and provides additional cumulative evidence that increased wildfire frequency is ongoing and, as detailed in the 2009 final listing rule, is likely facilitating the continued spread of invasive plant species and Owyhee harvester ant colony expansion, all of which continue to negatively affect *Lepidium papilliferum* and its habitat.

In addition to the geospatial information, a review of the rangewide HIP transect data for evidence of fire history revealed that, of the 80 transects, 5 transects (6.25 percent) had partially burned (with approximately half of the area unburned), 13 (16.25 percent) were predominantly burned, and 18 (22.5 percent) had completely burned (Colket 2009, Table 5). Of the remaining 44 transects, 38 (48 percent) showed no effects from wildfire and 6 others (7.5 percent) were predominantly unburned.

Climate change models also project a likely increase in wildfire frequency within the semiarid Great Basin region inhabited by *Lepidium papilliferum*. Arid regions such as the Great Basin where *L. papilliferum* occurs are likely to become hotter and drier; fire frequency is expected to accelerate, and fires may become larger and more severe (Brown *et al.* 2004, pp. 382–383; Neilson *et al.* 2005, p. 150; Chambers and Pellant 2008, p. 31; Karl *et al.* 2009, p. 83). Under projected future temperature conditions, the cover of sagebrush in the Great Basin region is anticipated to be dramatically reduced (Neilson *et al.* 2005, p. 154). Warmer temperatures and greater concentrations of atmospheric carbon dioxide create conditions favorable to *Bromus tectorum*, thus continuing the positive feedback cycle between the invasive annual grass and fire frequency that poses a

threat that is having a significant effect on *L. papilliferum* (Chambers and Pellant 2008, p. 32; Karl *et al.* 2009, p. 83). Under current climate-change projections, we anticipate that future climatic conditions will favor further invasion by *B. tectorum*, that fire frequency will continue to increase, and the extent and severity of fires may increase as well. If current projections are realized, the consequences of climate change are, therefore, likely to exacerbate the existing primary threats to *L. papilliferum* of frequent wildfire and invasive nonnative plants, particularly *B. tectorum*. As the Intergovernmental Panel on Climate Change (IPCC) projects that the changes to the global climate system in the 21st century will likely be greater than those observed in the 20th century (IPCC 2007, p. 45), we anticipate that these effects will continue and likely increase in the future. See *Climate Change* under Factor E, in the 2009 final listing rule for a more detailed discussion of climate change.

To determine the rate at which wildfire is impacting *L. papilliferum* habitats and how far into the future we can reasonably predict the likely effects of wildfire on the species, we assessed the available data regarding the extent of *L. papilliferum* habitat that is likely to burn each year. As reported above, over the past 55 years (1957 to 2012), the perimeters of 126 wildfires occurring within the known range of *L. papilliferum* have burned approximately 8,324 ac (3,369 ha), or 53 percent of the total *L. papilliferum* EO area rangewide (Hardy 2013, *in litt.*). Thus the annual mean habitat impact due to wildfire over the past 55 years is estimated at 150 acres per year (ac/yr) (61 hectares per year (ha/yr)). As noted above, we have adjusted our analysis to avoid the potential “double counting” of areas that have burned more than once, and this rate is

representative of the rate at which new (previously unburned) areas of *L. papilliferum* habitat are affected by wildfire. In the past 5 years alone (from 2008 to 2012), there were 15 fires that burned approximately 1,190 ac (482 ha) of *L. papilliferum* EOs, with approximately 850 ac (340 ha) located in areas that had not previously burned (Hardy 2013, *in litt.*). These data indicate that habitat impacts due to wildfire have averaged nearly 170 ac/yr (69 ha/yr) in the past 5 years.

At present, we estimate there are approximately 7,567 ac (3,064 ha) of *L. papilliferum* habitat remaining that have not yet been negatively impacted by fire. It is our best estimate that future rates of habitat impact will continue at the recently observed rate of between 150 ac/yr (61 ha/yr) and 170 ac/yr (69 ha/yr); we believe this is a conservative estimate, as it does not account for potentially greater rates of loss due to the likely effects of climate change and increasing coverage of *Bromus tectorum*. Based on the 55 years of accurate data regarding wildfire impacts accumulated so far, we can reasonably and reliably predict that this rate will continue into the future at least until the point when no unburned habitat for the species will likely remain, which is approximately 50 years (Figure 1; USFWS 2013, *in litt.*). Based on the observed rates of habitat impact due to wildfire, we can reliably predict that approximately 80 to 90 percent of the remaining *L. papilliferum* habitat not yet impacted by fire will be negatively affected by wildfire within roughly the next 36 to 47 years (Figure 1). Or, to look at it another way, within the next 36 to 47 years, only 10 to 20 percent of remaining *L. papilliferum* habitat will likely be unaffected by wildfire.

As discussed in more detail below in the *Summary of Factors Affecting the Species*, we conservatively conclude that, at this point, the species will be in danger of extinction. Thus, because we can reasonably predict that *L. papilliferum* is likely to become an endangered species in approximately 36 to 47 years, we consider that projection to occur within the foreseeable future, which is at least 50 years based on the rate at which the primary effect of wildfire is expected to act on the species. Because of the synergistic interaction between wildfire and the invasion of nonnative plant species, by association, we assume that future colonization of *L. papilliferum* habitat by invasive nonnatives will proceed on approximately the same timetable (discussed further below).

We recognize that our model (Figure 1; USFWS 2013, *in litt.*) is relatively simple, assuming, for example, that the impacts to habitat from wildfire will continue to occur at a constant rate over time, when in reality the extent of area affected by wildfire will vary from year to year. However, for our purposes of developing a reliable estimate of a timeframe within which *L. papilliferum* is likely to become endangered, we believe this projection makes reasonable use of the best scientific data available to predict the effects of wildfire on the species over time. As noted above, because of the close and synergistic association between the occurrence of wildfire and invasion by nonnative plants, followed by habitat loss and fragmentation, we believe this timeframe similarly applies to the primary threat of invasive nonnative plants and fragmentation and isolation as well.

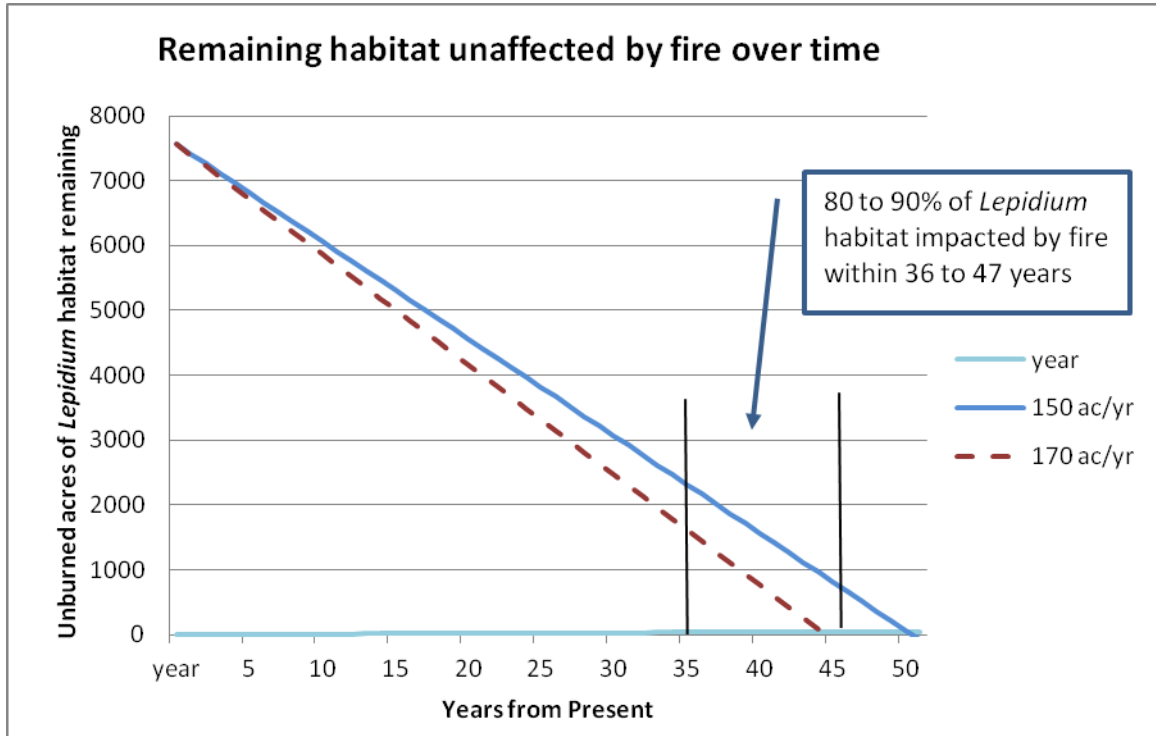


Figure 1. Rate of ongoing impacts due to wildfire in remaining *Lepidium papilliferum* habitat (USFWS 2013, in litt.).

In summary, wildfire effects have already impacted 53 percent of the total *Lepidium papilliferum* EO area rangewide. At the current rate of habitat impacted by wildfire, we anticipate that 80 to 90 percent of the remaining *L. papilliferum* habitat will be affected by wildfire within approximately the next 36 to 47 years. Because we can reliably predict that the threats of wildfire, and, by association, invasive, nonnative plant species, will cause the species to be in danger of extinction at this point, this time period of 36 to 47 years is within the foreseeable future.

#### *Invasive, Nonnative Plant Species*

The rate of conversion from native sagebrush-steppe to primarily nonnative annual grasslands continues to accelerate in the Snake River Plain of southwest Idaho (Whisenant 1990, p. 4), and is closely tied to the increased frequency and shortened intervals between wildfires. The continued spread of *Bromus tectorum* throughout the range of *Lepidium papilliferum*, coupled with the lack of effective methods to control or eradicate *B. tectorum*, leads us to conclude that the extent and frequency of wildfires will continue to increase indefinitely, given the demonstrated positive feedback cycle between these factors (Whisenant 1990, p. 4; Brooks and Pyke 2001, p. 5; D’Antonio and Vitousek 1992, pp. 73, 75; Brooks *et al.* 2004, p. 678). Under current climate change projections, we also anticipate that future climatic conditions will favor further invasion by *B. tectorum*, that fire frequency will likely increase, and the extent and severity of fires may increase as well (Brown *et al.* 2004, pp. 382–383; Neilson *et al.* 2005, p. 150; Chambers and Pellant 2008, pp. 31–32; Karl *et al.* 2009, p. 83, Bradley *et al.*, in press, p. 5). As summarized in our 2009 final listing rule, “...if the invasion of *B. tectorum* continues at the rate witnessed over the last century, an area far in excess of the total range occupied by *L. papilliferum* could be converted to nonnative annual grasslands within the foreseeable future” (74 FR 52032).

Invasive, nonnative plants have become established in *Lepidium papilliferum* habitats by spreading through natural dispersal (unseeded) or have been intentionally planted as part of revegetation projects (seeded). Invasive nonnative plants can alter multiple attributes of ecosystems, including geomorphology, wildfire regime, hydrology, microclimate, nutrient cycling, and productivity (Dukes and Mooney 2003, pp. 1–35).

They can also negatively affect native plants through competitive exclusion, niche displacement, hybridization, and competition for pollinators; examples are widespread among native taxa and ecosystems (D'Antonio and Vitousek 1992, pp. 63–87; Olson 1999, p. 5; Mooney and Cleland 2001, p. 1).

Invasive nonnative plant species pose a serious and significant threat to *Lepidium papilliferum*, particularly when the synergistic effects of nonnative, annual grasses and wildfire are considered. Invasive, nonnative, unseeded species that pose threats to *L. papilliferum* include the annual grasses *Bromus tectorum* and *Taeniatherum caput-medusae* that are rapidly forming monocultures across the southwestern Idaho landscape. Evidence that *B. tectorum* is likely displacing *L. papilliferum* is provided by Sullivan and Nations' (2009, p. 135) statistical analyses of *L. papilliferum* abundance and nonnative invasive plant species cover within slickspots. Working with 5 years of HIP data collected from 2004 through 2008, Sullivan and Nations found that the presence of other plants in slickspots, particularly invasive exotics such as *Bassia prostrata* (forage kochia), a seeded nonnative plant species, and *Bromus tectorum*, was associated with the almost complete exclusion of *L. papilliferum* from those microsites (Sullivan and Nations 2009, pp. 111–112). According to their analysis, the presence of *B. tectorum* in the surrounding plant community shows a consistently significant negative relationship with the abundance of *L. papilliferum* across all physiographic regions (Sullivan and Nations 2009, pp. 131, 137), and a significant negative relationship with *L. papilliferum* abundance within slickspots in the Snake River Plain and Boise Foothills regions (Sullivan and Nations 2009, p. 112).

Additionally, we have increasing evidence that nonnative plants are invading the slickspot microsite habitats of *Lepidium papilliferum* (Colket 2009, Table 4, pp. 37–49) and successfully outcompeting and displacing the species (Grime 1977, p. 1185; DeBolt 2002, *in litt*; Quinney 2005, *in litt*; Sullivan and Nations 2009, p. 109). Monitoring of HIP transects shows that *L. papilliferum*-occupied sites that were formerly dominated by native vegetation are showing relatively rapid increases in the cover of nonnative plant species (Colket 2008, pp. 1, 33). Regarding *Bromus tectorum* in particular, vast areas of the Great Basin are already dominated by this nonnative annual grass, and projections are that far greater areas are susceptible to future invasion by this species (Pellant 1996, p. 1). In addition, most climate change models project conditions conducive to the further spread of nonnative grasses such as *B. tectorum* in the Great Basin desert area occupied by *L. papilliferum* in the decades to come (see *Climate Change* under Factor E, below).

Geospatial analyses indicate that by 2008 approximately 20 percent of the total area of all *Lepidium papilliferum* EOs rangewide was dominated by introduced invasive annual and perennial plant species (Stoner 2009, p. 81). Because this analysis only considered areas that were ‘dominated’ by introduced invasive species, it does not provide a comprehensive estimate of invasive species presence within the range of *L. papilliferum*. For example, the 2008 HIP monitoring results revealed that all 80 HIP transects monitored within 54 EOs had some (Colket 2009, Table 4, pp. 37–49) nonnative, unseeded plant cover. The 2008 HIP monitoring results also revealed that, of the 80 HIP transects, 18 transects had some level of nonnative, seeded plant cover

(Colket 2009, Table 4, pp. 37–49). In addition, monitoring of HIP transects rangewide indicated that nonnative plant cover is continuing to increase at a relatively rapid pace (Colket 2008, pp. 1, 3). For example, Colket (2008, pp. 1–3) reported increases in nonnative plant species cover of 5 percent or more over the span of 4 to 5 years in 28 percent of the HIP transects formerly dominated by native plant species. More recent data collected by the Idaho Department of Fish and Game (IDFG) since 2009 indicates that the number of transects with a percent or more increase in nonnative cover since establishment of the transect has significantly increased from 40 transects in 2009 to 61 transects in 2011 (IDFG 2012, pp. 12–13). In the 2012 report (p. 10), it was noted that “many transects had far more than a 5% increase, and some were so heavily invaded that they were barely recognizable as slickspots.”

Bradley and Mustard (2006, p. 1146) found that the best indicator for predicting future invasions of *Bromus tectorum* was the proximity to current populations of the grass. Colket (2009, pp. 37–49) reports that 52 of 80 HIP transects (65 percent) had *B. tectorum* cover of 0.5 percent or greater within slickspots in at least 1 year between 2004 and 2008; nearly 95 percent of slickspots had some *B. tectorum* present. If current proximity to *B. tectorum* is an indicator of the likelihood of future invasion by that nonnative species, then *Lepidium papilliferum* is highly vulnerable to future invasion by *B. tectorum* throughout its range. If the invasion of *B. tectorum* continues at the rate witnessed over the last century, an area far in excess of the total range occupied by *L. papilliferum* could be converted to nonnative annual grasslands in the near future. First introduced around 1889 (Mack 1981, p. 152), *B. tectorum* cover in the Great Basin is

now estimated at approximately 30,000 mi<sup>2</sup> (80,000 km<sup>2</sup>) (Menakis *et al.* 2003, p. 284), translating into an historical invasion rate of approximately 300 mi<sup>2</sup> (700 km<sup>2</sup>) a year over 120 years. In addition, climate change models for the Great Basin region also predict climatic conditions that will favor the growth and further spread of *B. tectorum* (See *Climate Change* under Factor E, in the 2009 final rule (74 FR 52014; October 8, 2009) for a more detailed discussion of climate change).

Given the observed negative association between the abundance of *Lepidium papilliferum* and invasive nonnative plants both within slickspot microsites and in the surrounding plant community, the demonstrated ability of some nonnative plants to displace *L. papilliferum* from slickspots, and the recognized contribution of nonnative plants such as *Bromus tectorum* to the increased fire frequency that additionally poses a primary threat to the species, we consider invasive nonnative plants to pose a threat that is having a significant effect on *L. papilliferum*. Currently, there are no feasible means of controlling the spread of *B. tectorum* or the subsequent increases in wildfire frequency and extent once *B. tectorum* is established on a large scale (Pellant 1996, pp. 13–14; Menakis *et al.* 2003, p. 287; Pyke 2007). The eradication of other invasive nonnative plants poses similar management challenges, and future land management decisions will determine the degree to which seeded nonnative plants may affect *L. papilliferum*.

In summary, data shows that all 80 HIP monitoring transects have some level of invasive nonnative plant species; that by 2008, 20 percent of the total area of all *Lepidium papilliferum* EOs rangewide was dominated by introduced invasive plant species; and

nonnative plant cover is continuing to increase at a relatively rapid rate. Given the synergistic relationship between wildfire and the spread of invasive nonnative plant species, such as *Bromus tectorum*, combined with the fact that broadscale eradication methods for controlling these threats have not been developed, we anticipate that 80 to 90 percent of the remaining *Lepidium papilliferum* habitat will be affected by invasive nonnative plant species, to the point where they are outcompeting *L. papilliferum*, on a timeframe similar to that of increased wildfire effects. As with the primary threat of wildfire, because we can reliably predict that the associated primary threat of invasive, nonnative plant species will cause the species to be in danger of extinction in approximately 36 to 47 years, this time period is within the foreseeable future.

#### *Planned or Proposed Development*

Although the threat of development is relatively limited in geographic scope, the effect of development on *Lepidium papilliferum* can be severe, potentially resulting in the direct loss of individuals, and perhaps more importantly, the permanent loss of its unique slickspot microsite habitats. As described in the Background section of the 2009 final listing rule, *L. papilliferum* occurs primarily in specialized slickspot microsites. Slickspots and their unique edaphic and hydrological characteristics are products of the Pleistocene period, and they likely cannot be recreated on the landscape once lost. The potential, direct loss of slickspots to the effects from development, particularly those slickspots that are currently occupied by the species and provide the requisite conditions

to support *L. papilliferum*, is therefore of great concern in terms of providing for the long-term viability of the species.

Development can also affect *Lepidium papilliferum* through indirect effects by contributing to increased habitat fragmentation, nonnative plant invasion, human-caused ignition of wildfires, and potential reductions in the population of insect pollinators. Development of sagebrush-steppe habitat is of particular concern in the Boise Foothills region, which, although relatively limited in its geographic extent, supports the highest abundance of *L. papilliferum* plants per HIP transect (Sullivan and Nations 2009, pp. 3, 103, 134). Past development has eliminated some historical *L. papilliferum* EOs (Colket *et al.* 2006, p. 4), and planned and proposed future developments threaten several occupied sites in the Snake River Plain and Boise Foothills regions (see below). Most of the recent development effects have occurred on the Snake River Plain and Boise Foothills regions, which collectively comprise approximately 83 percent of the extent of EOs; development has not been identified as an issue on the Owyhee Plateau (Stoner 2009, pp. 13–14, 19–20).

In the 2009 final listing rule (74 FR 52036), we were aware of 10 approved or proposed development projects planned for these regions (State of Idaho 2008, pp. 3–5), which would affect 13 out of 80 EOs (16 percent of EOs). However, many of these proposed developments and associated infrastructure projects are no longer being considered for implementation. Currently, we are aware of only three projects that could potentially affect *Lepidium papilliferum* and its habitat (Chaney, pers. comm. 2013a).

The Spring Valley Planned Community (a.k.a., the M3 Development), is a 5,600-ac (2,300-ha) development that is scheduled for initiating construction in 2013 in the foothills north of Eagle. Construction is planned for five phases over a 20-year period. It is expected that the development and its associated infrastructure on adjacent Federal lands will result in some effects to the species and its habitat at three EOs (52, 76, and 108) (Hardy, pers. comm. 2013). The Dry Creek Ranch Development is a 1,400-ac (570-ha) development located north of Hidden Springs in Idaho. It is proposed to be built in five phases over a 10-year period (Chaney, pers. comm. 2013b). This development appears to overlap slightly with EO 38 (a D-ranked EO). Due to the low quality of the development map, the amount of overlap is uncertain, although it appears to be a very small area relative to the size of the EO polygon (Chaney, pers. comm. 2013c). This area is currently proposed as a designated natural area of the development; therefore, direct effects associated with construction of the development are expected to be minimal.

In addition, the Gateway West Transmission Line Project, which is scheduled to be constructed in phases from 2016 through 2021, would likely affect the species and its habitat, including proposed critical habitat, in southwestern Idaho. Although a final routing of the project has not yet been determined, the Gateway West Transmission Line Project could potentially affect 5 EOs within the project footprint and a total of 11 EOs within the Action Area (defined as the right-of-way footprint and the additional 0.5-mi (0.8-km) buffer (Tetra Tech 2013, p. 64)).

Though these developments and associated infrastructure projects have not yet been constructed, they define the foreseeable future with respect to development. Given the current information, based on approved or proposed project plans and proposed construction timelines, we anticipate that approximately 17 percent of known *Lepidium papilliferum* EOs will be affected by development within the next 20 years. This period of time represents the foreseeable future with respect to development, as this is the period of time over which we can reasonably predict development and associated infrastructure projects that will likely occur. The threat of development will have a negative effect on the species in combination with the primary threats of wildfire and invasive, nonnative plants. However, the effects of development are secondary to the effects on the species from the primary threats of an altered wildfire regime and invasive nonnative plants; thus, we do not anticipate that the threat of development alone will cause *L. papilliferum* to become an endangered species within this timeframe or significantly alter our prediction of when this species will become in danger of extinction.

#### *Habitat Fragmentation and Isolation of Small Populations*

*Lepidium papilliferum* occurs in naturally patchy microsite habitats, and the increasing degree of habitat fragmentation produced by wildfires and development threatens to isolate and fragment populations beyond the distance that its insect pollinators are capable of traveling. Genetic exchange in *L. papilliferum* is achieved through either seed dispersal or insect-mediated pollination (Robertson and Ulappa 2004, pp. 1705, 1708; Stillman *et al.* 2005, pp. 1, 6–8), and plants that receive pollen from more

distant sources demonstrate greater reproductive success in terms of seed production (Robertson and Ulappa 2004, pp. 1705, 1708). *Lepidium papilliferum* habitats separated by distances greater than the effective range of available pollinating insects are at a genetic disadvantage, and may become vulnerable to the effects of loss of genetic diversity (Stillman *et al.* 2005, pp. 1, 6–8) and a reduction in seed production (Robertson *et al.* 2004, p. 1705). A genetic analysis of *L. papilliferum* suggested that populations in the Snake River Plain and the Owyhee Plateau may have reduced genetic diversity (Larson *et al.* 2006, p. 17; note the Boise Foothills were not analyzed separately in this study).

Many of the remaining occurrences of *Lepidium papilliferum*, particularly in the Snake River Plain and Boise Foothills regions, are restricted to small, remnant patches of suitable sagebrush-steppe habitat. When last surveyed, 31 EOs (37 percent) each had fewer than 50 plants (Colket *et al.* 2006, Tables 1 to 13). Many of these small remnant EOs exist within habitat that is degraded by the various threat factors previously described. Small *L. papilliferum* populations are likely persisting due to their long-lived seed bank, but the long-term risk of depletion of the seed banks for these small populations and the elimination of new genetic input make the persistence of these small populations uncertain. Providing suitable habitats and foraging habitats for the species' insect pollinators is important for maintaining *L. papilliferum* genetic diversity. Small populations are vulnerable to relatively minor environmental disturbances such as wildfire, herbicide drift, and nonnative plant invasions (Given 1994, pp. 66–67), and are subject to the loss of genetic diversity from genetic drift and inbreeding (Ellstrand and

Elam 1993, pp. 217–237). Smaller populations generally have lower genetic diversity, and lower genetic diversity may in turn lead to even smaller populations by decreasing the species' ability to adapt, thereby increasing the probability of population extinction (Newman and Pilson 1997, p. 360).

Habitat fragmentation from the effects of development or wildfires has affected 62 of the 79 EOs for which habitat information is known (15 of 16 on the Boise Foothills, 35 of 42 on the Snake River Plain, and 12 of 21 on the Owyhee Plateau), and 78 EOs (all except one on the Owyhee Plateau) have fragmentation occurring within 1,600 ft (500 m) of the EOs (Cole 2009, Threats Table). Additionally, development projects are planned within the occupied range of *Lepidium papilliferum* that would contribute to further large-scale fragmentation of its habitat, potentially resulting in decreased viability of populations through decreased seed production, reduced genetic diversity, and the increased inherent vulnerability of small populations to localized extirpation (See *Development*, above).

In summary, the increasing degree of fragmentation of *Lepidium papilliferum* and its habitat is primarily produced by wildfires, loss and conversion of surrounding sagebrush-steppe habitats, and the effects of development. We can reliably predict that habitat fragmentation effects will continue at a rate similar to wildfire and other threat effects, such that 80 to 90 percent of the remaining *L. papilliferum* habitat will be affected within roughly the next 36 to 47 years, which is, therefore, within the foreseeable future.

### *Owyhee Harvester Ants*

In recent years, concern has emerged over the potential detrimental effects of seed predation on *Lepidium papilliferum* by the Owyhee harvester ant (Robertson and White 2009). Robertson and White reported that Owyhee harvester ants can remove up to 90 percent of *L. papilliferum* fruits and seeds, either directly from the plant or by scavenging seeds that drop to the ground (Robertson and White 2009, p. 9). A more recent study (Robertson and Crossman, 2012) corroborated the results from Robertson and White (2009), and goes further by showing that seed loss through predation by Owyhee harvester ants remains high (median = 92 percent), even when total seed output for individual plants is considered. For example, in one of their paired samples, they found 4,861 seeds beneath the control plant, but only 301 seeds beneath the plant exposed to ants. In another, they found 2,328 seeds beneath the control plant and 365 beneath the treatment plant. These results demonstrate that Owyhee harvester ants have the capacity to remove a large percentage of the seeds produced by *L. papilliferum*, even when seed output numbers in the thousands.

Data also suggests that the number of Owyhee harvester ant colonies is increasing in the range of *Lepidium papilliferum*. In 2010, researchers recorded 842 harvester ant colonies across 15 study sites. Results from 2012 demonstrate that only 2 years later, that number has increased to 947 colonies, which represents a 12.5 percent increase, resulting from the loss of 133 colonies and the addition of 239 (Robertson 2013, p. 4).

Although Owyhee harvester ants are a native species, they are increasingly colonizing areas occupied by *Lepidium papilliferum* in response to the ongoing degradation of native sagebrush systems. The expansion of Owyhee harvester ant colonies coincides with the replacement of sagebrush by grasses, and the increase in seed predation as a consequence of harvester ants expanding into areas adjacent to occupied slickspots has the potential to significantly affect *L. papilliferum* recruitment and the replenishment of the seed bank, which could affect the long-term viability of *L. papilliferum*.

Studies are currently underway to investigate Owyhee harvester ant colony dynamics within *Lepidium papilliferum* habitat. However, we currently lack enough data to develop a foreseeable future estimate for this threat at this time, although we expect the threat to continue to increase as the number of ant colonies continues to increase as a result of increased wildfire and the associated conversion of sagebrush to grasses.

#### *Consideration of Conservation Measures*

The threats to *Lepidium papilliferum* are ongoing and acting synergistically to negatively affect the species and its habitat, and are expected to continue into the foreseeable future. Although conservation measures to address some of these threat factors have been considered by the Service, as described in the 2009 final listing rule, effective controls to address the increased frequency of wildfire and eradicate the

expansive infestation of nonnative plants throughout the range of *L. papilliferum* are not currently available, nor do we anticipate that controls will become available anytime soon that are likely to be effective on a scale sufficient to prevent the species from becoming in danger of extinction in the foreseeable future.

In addition to those conservation measures evaluated in the 2009 final listing rule, we considered a relatively new conservation measure. Rangeland Fire Protection Associations (RFPAs) are currently being established in some parts of southern Idaho, where important habitat for Greater sage-grouse (*Centrocercus urophasianus*) (“sage-grouse”) occurs. These RFPAs are designed to provide ranchers and landowners in rural areas with the necessary tools and training to allow them to assist with wildfire prevention and respond quickly to wildfire in areas containing sage-grouse habitat. One of these RFPAs, the Three Creek RFPA, has been established within the *Lepidium papilliferum* Owyhee Plateau physiographic region, where both *L. papilliferum* and sage-grouse co-occur. Benefits from first response to wildland fires that are realized to sage-grouse within this RFPA may also extend to *L. papilliferum* habitat in that area. Another RFPA, the Mountain Home RFPA, is located in the vicinity of *L. papilliferum* occupied habitat within the Snake River Plain physiographic region.

Idaho Code Section 38-104 was amended during the 2013 legislative session to clarify the requirements and process for the establishment of the RFPAs (State Board of Land Commissioners, 2013). Applicants that meet the requirements of an RFPA enter into a Master Agreement with the State, which provides them with the legal authority to

detect, prevent, and suppress fires in the RFPAs boundaries. RFPAs also require a Cooperative Fire Protection Agreement between the individual RFPAs and the appropriate Federal agency, which provides the RFPAs the authority to take action on Federal land (Houston 2013, pers. comm.; Glazier 2013, pers. comm.). Although RFPAs have not yet demonstrated their ability to address the increased frequency of wildfire within the range of *L. papilliferum*, effective management of fire as a threat is often dependent on the timeliness of initial response efforts. Therefore, while RFPAs have not yet shown to be effective to offset the threats to the species to the point that it is not likely to become an endangered species within the foreseeable future, we view their formation as a positive conservation step for sagebrush-steppe habitat.

#### *Summary of Factors Affecting the Species*

The current status of *Lepidium papilliferum* reflects the past effects from the threats described above that have already affected or degraded more than 50 percent of the species' unique habitats, as well as the continued and ongoing vulnerability of the species' slickspot habitats to these same threats. Because we still do not see strong evidence of a steep negative population trend for the species (consistent with what we described in our 2009 final listing rule (74 FR 52051)), we believe that *L. papilliferum* is not in immediate danger of extinction. We do, however, conclude that *L. papilliferum* is likely to become in danger of extinction in the foreseeable future, based on our assessment of that period of time over which we can reasonably rely on predictions regarding the threats to the species. Our analysis has led us to conclude that future

effects from the synergistic and cumulative effects of increased wildfire, invasive nonnative plants, development, and other threat factors will affect the remaining *L. papilliferum* habitats at a level where the species would persist in only a small number of isolated EOs, with 80 to 90 percent of its remaining habitat impacted by these threats, and most likely with small populations and fragmented from other extant populations. At this point, we would consider the species to be in danger of extinction.

Given the wildfire history that has affected approximately 53 percent of the *L. papilliferum* habitat over the last 55 years (1957–2012), combined with the ongoing, expansive infestation of invasive plants across the species' range, and the fact that no broad-scale *Bromus tectorum* eradication methods or effective means for controlling the altered wildfire regime have been developed, these threats to *L. papilliferum* can reasonably be anticipated to continue for at least 50 years, and probably indefinitely. This information (in concert with the observed negative association between these ongoing and persistent threats and the species' distribution and abundance throughout its range, along with reasonable predictions about future conditions) leads us to the conclusion that at the current and anticipated rate of future habitat effects, *L. papilliferum* is likely to be in danger of extinction within the next 36 to 47 years, which is within the foreseeable future (the time period of at least 50 years, over which we can reliably predict the primary threat factors will continue to act upon the species). At this point, we believe 80 to 90 percent of its habitat will have been affected by the primary threats to the species, and *L. papilliferum* would likely persist only in a small number of isolated and fragmented populations.

## Determination

Based on an assessment of the best scientific and commercial data available regarding the present and future threats to the species, we conclude that threatened status should be reinstated for *Lepidium papilliferum*. The plant is endemic to southwest Idaho and is limited in occurrence to an area that totals approximately 16,000 ac (6,500 ha). The species' unique slickspot habitats are finite and are continuing to degrade in quality due to a variety of threats. The species' limited area of occurrence makes it particularly vulnerable to the various threats affecting its specialized microsite habitats, and more than 50 percent of *L. papilliferum* EOs are already known to have been impacted from the effects of wildfire. The primary threats to the species are the effects of wildfire and invasive nonnative plants, especially *Bromus tectorum*. As stated in our 2009 final listing rule, we now have information indicating a statistically significant negative association between *L. papilliferum* abundance and wildfire, and between *L. papilliferum* abundance and cover of *B. tectorum* in the surrounding plant community. These negative associations are consistent throughout the range of the species. Wildfire continues to affect *L. papilliferum* habitat throughout the range at an annual rate higher than described in our 2009 final listing rule, and we expect this trend to continue and possibly further increase due to the projected effects of climate change. Furthermore, *B. tectorum* and other nonnative species continue to spread and degrade the sagebrush-steppe ecosystem where *L. papilliferum* persists, and we anticipate increased wildfire frequency and effects in those areas where nonnative plant species, especially *B. tectorum*, are dominant.

Similar to our findings in our 2009 final listing rule, although we do not see strong evidence of a steep negative population trend for the species, it should be noted that the total number of *Lepidium papilliferum* plants counted in HIP monitoring in 2011 and 2012 were the lowest since 2005, when complete counts for the species were initiated, with 16,462 plants in 2011 and 9,202 plants in 2012. Above-ground numbers of *L. papilliferum* individuals can fluctuate widely from one year to the next; however, because the primary threats of wildfire and nonnative invasive plants, especially *Bromus tectorum*, are currently affecting the species throughout its limited range, the recent 2011 and 2012 low population counts are of concern. All available information indicates that all the significant threats described in the 2009 final listing rule and this new analysis, including wildfire, nonnative invasive plants, development, and habitat fragmentation, will continue and likely increase into the foreseeable future. The projected future effects of climate change will further magnify the primary threats from wildfire and *B. tectorum*, and, by association with the resulting increase in grasses, the further expansion of Owyhee harvester ants. Although conservation measures to address some of these threat factors have been considered by the Service, effective controls to address the increased frequency of wildfire and eradicate the expansive infestation of nonnative plants throughout the range of the *L. papilliferum* are not currently available and are not likely to be available within the foreseeable future.

As found in our 2009 final listing rule (74 FR 52052), we anticipate the continuation or increase of all of the significant threats to *Lepidium papilliferum* into the

foreseeable future, even after accounting for ongoing and planned conservation efforts, and we find that the best available scientific data indicate that the negative consequences of these threats on the species will likewise continue or increase. Population declines and habitat degradation will likely continue in the foreseeable future to the point at which *L. papilliferum* will become in danger of extinction.

Section 3 of the Act defines an endangered species as “any species which is in danger of extinction throughout all or a significant portion of its range” and a threatened species as “any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.” Because we have not yet observed the extirpation of local *Lepidium papilliferum* populations or steep declines in trends of abundance, we do not believe the species is presently in danger of extinction, or meets the definition of an endangered species. However, as noted earlier, we do anticipate that *L. papilliferum* will become in danger of extinction when it reaches the point that its habitat has been so diminished that the species persists only in a small number of isolated EOs, with small populations that are fragmented from other extant populations. We conservatively estimate this point will be reached in approximately 36 to 47 years, when 80 to 90 percent of its remaining habitat will have been affected based on the ongoing range of rates of *L. papilliferum* habitat impacted by fire, and the close association between fire and invasion by *Bromus tectorum* and other nonnative invasive plants. We can, therefore, reasonably assume that, without the unanticipated development of future effective conservation measures, the magnitude of the threats affecting *L. papilliferum* and its habitats will become progressively more severe, and that

those threats, acting synergistically, are likely to result in the species becoming in danger of extinction within the next 36 to 47 years, which is within the foreseeable future as we have defined it here for the species. Therefore, we conclude that, under the Act, threatened status should be reinstated for *L. papilliferum* throughout all of its range, and we seek public input on this determination. If, following consideration of public comments, we decide to list *L. papilliferum* under the Act, we will also pursue designating critical habitat for this species. For information and the opportunity to comment on that proposed rulemaking process, see our related document published elsewhere in today's **Federal Register**.

## **References Cited**

A complete list of all references cited in this rule is available on the Internet at <http://www.regulations.gov> . In addition, a complete list of all references cited herein, as well as others, is available upon request from the Idaho Fish and Wildlife Office, Boise, Idaho (see **ADDRESSES**).

## **Authors**

The primary authors of this document are the staff members of the Idaho Fish and Wildlife Office, U.S. Fish and Wildlife Service (see **ADDRESSES**).

**Authority**

The authority for this action is the Endangered Species Act of 1977, as amended (16 U.S.C. 1531 *et seq.*).

Dated: January 14 2014\_\_\_\_\_

Signed: Stephen D. Guertin\_\_\_\_\_

Deputy Director, U.S. Fish and Wildlife Service

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